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MONTANA AGRICULTURAL COLLEGE
EXPERIMENT STATION.

F. B. LINFIELD, Director

BULLETIN NO. 64

FOURTH ANNUAL REPORT
OF THE
State Entomologist of Montana.

BY
R. A. COOLEY.

BOZEMAN, MONTANA

DECEMBER

1906

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LETTER OF TRANSMITTAL.

To His Excellency, Joseph K. Toole,
Governor of Montana:

Dear Sir:—I have the honor to present herewith my Fourth Annual Report as State Entomologist of Montana. It will be noticed that this report is briefer than those previously made and I would respectfully call your attention to the reasons for this, stated in one of the early pages of the report.

Very respectfully,

R. A. COOLEY.

Financial Statement.

May 20, Livery to Chesnut	\$ 3.50
May 30—June 3, Expense of trip to Billings and vicinity	21.90
June 20, Livery to Spring Hill	5.00
July 6—13, Expense self and assistants to Billings and other Yellowstone Valley points	82.30
Aug. 12—16, Expense of trip to Glendive	45.90
Aug. 26—Sept. 2, Expense of trip to Helena and Lewistown..	30.95
Sept. 6—11, Expense of trip to Missoula and Hamilton	22.30
Aug. 1—6, Expense of trip to Missoula and Ravalli	28.40
Sept. 25, Livery one-half day in Gallatin Valley.....	3.00
Oct. 1, Livery one day in Gallatin Valley	5.00
Oct. 2-7, Expense of trip to Helena.....	12.50
Oct. 19, Livery one-half day in Gallatin Valley	3.00
Total.....	<hr/> \$263.40

FOURTH REPORT OF THE STATE ENTOMOLOGIST OF MONTANA.

In the three previous reports of the State Entomologist, a total of about 200 pages, we have attempted to put in easily accessible form the most necessary information regarding Montana's leading insect pests and those liable to be introduced. The preparation of these reports has required a large amount of investigation and routine work, and has occupied a large part of the time of the entomologist of the Experiment Station not absorbed by his teaching and other duties.

With the passage of the Adams Act by Congress, thereby more liberally endowing the Experiment Station, a considerable change was made in the requirements of experiment station workers. The new fund is much more closely restricted in the manner that it may be expended. Expenditures under the new act must be for the investigation of specific problems and only for real research work. The authorities of the Montana Experiment Station have assigned to the entomologist a liberal share of the new fund, and definite investigations have been taken up which will require several years for their completion. The method of work will necessarily be more exhaustive and technical, and we believe that the results will be correspondingly more valuable. Our efforts will necessarily be confined to a more restricted field and it will be necessary, until more liberal funds are allowed the department, to omit the making of such general investigations and notes as have been published in the first three Annual Reports. As occasion demands we shall in the future, from time to time, publish bulletins on the more important insect pests

that become prominent as destroyers of farm crops, garden and orchard products and such others as may be injurious to the interests of Montana's citizens. In view of the various other duties laid upon the entomologist, it will be out of the question to prepare an annual report each year, which gives definite information based on investigations and experiments regarding the various pests that will appear, unless the department receives an increased appropriation sufficient to permit the employment of a well qualified assistant to conduct investigations under the direction of the entomologist and to do such routine work as such investigations make necessary.

We feel that the provisions of the law creating the office of State Entomologist were wise ones and that although for a few years there may be no lengthy report published, the benefits derived from the law will be far out of proportion to the small appropriation made in the law. The law requires that the State Entomologist shall go to the scene of the outbreak of each insect pest of prominence and shall investigate the conditions in the field. There is always a tendency in experiment station entomology for the officer in charge to conduct most of his work in his home laboratory. His work is necessarily technical and requires close application of himself or an assistant and it is often difficult to get away to go into the field, and yet without such trips into the field the entomologist cannot know the needs of his state as perfectly as he should.

It is therefore our intention to keep in touch with the needs of Montana and publish annually a brief report. For the present it will be necessary to confine our investigations largely to such lines of work as have been taken up in accordance with the Adams Act.

The law creating the office of State Entomologist requires that an annual report shall be made to the Governor which shall be published by the Experiment Station as one of its regular bulletins and shall contain a report of his work and expenditures. The first three reports were made to contain practically the full results of the entomologists work so far as completed. In view of the fact that the Federal Government furnishes the salary of the entomologist and provides the funds for the equipment and assistance, we feel that the briefer reports contemplated are sufficient to both satisfy the requirements of the state law and fairly represent the amount of appropriation the law carries. For the ultimate best results, we feel that the present course is a wise one.

NOTABLE INSECTS OF THE YEAR 1906.

AN UNDETERMINED CUTWORM. Family NOCTUDÆ, Order LEPIDOPTERA.

During October and November the office received several notices of the occurrence of a pest in the winter wheat fields of the "Flathead District," north of Bozeman. From specimens sent in and brought in it was found that the trouble was due to caterpillars, commonly called cut worms, and belonging to the family Noctuidæ. We were first informed of this pest through Mr. T. S. Stiles, R. F. D. No. 1, Belgrade, who, writing under date of Oct. 25th, stated that the insect was doing a great deal of damage. From that time on we had a number of complaints from others in that locality. Much of our information we received through Mr. Flinner, who, on November 30th, came to the College, bringing a box of specimens. From his report also it is apparent that the caterpillars were very numerous and had damaged more or less seriously many acres of grain. Specimens were put in cages in the greenhouse and fed on grasses and grains and they grew rapidly until about January 1st, when it was found that they were rapidly dying from an unknown cause. Prof. Swingle was asked to make bacteriological cultures from the bodies of the caterpillars, both living and dead, but no report can yet be made on this subject.

It is impossible to say to what extent this insect will be injurious next spring, but there is some reason to fear that extensive damage will be done unless the invaders are killed off during the winter or early spring by natural conditions. It is to be expected that all the caterpillars that survive the winter will resume feeding in the spring, later transform to the moth stage and again deposit eggs.

THE SUGAR BEET WEBWORM, *Loxostege sticticalis* Linn.
Family PYRALIDÆ, Order LOPIDOPTERA.

This important pest of sugar beets was found in a few beet fields west of Billings. A few fields were so eaten by the caterpillars that the foliage turned brown and the beets appeared to be about dead; yet a few weeks later they recovered their normal appearance by putting forth new leaves, and in the fall, while not looking as well as beets that had not been so eaten back, they produced beets of good size. The effects of this insect were most prominent about June 20th. The same insect was also sent in from Chinook by W. D. Smotherman.

The presence of this insect in Montana is of considerable interest to growers of sugar beets in Montana and a considerable injury is liable to be done by it if it shows a power to produce more than one full brood.

THE CODLING MOTH, *Cydia pomonella* Linn. Family
TORTRICIDÆ, Order LEPIDOPTERA.

This pest, which is, with good reason, more dreaded by apple growers in Montana than any other, has been reported from two additional places during the year. Mr. Manley, of Pony, found his apples to be wormy this season, and it is also reported to be present in the Stillwater valley south of Columbus.

A CUT-WORM ON LAWNS. *Carneades rubefactalis* Grt.
Family NOCTUIDÆ, Order LEPIDOPTERA.

We received word a number of times in the spring of the year that cut-worms were very abundant in lawns and gardens in Bozeman, and specimens taken from the lawn on the College campus developed into a moth which, through the kindness of Dr. L. O. Howard, of the U. S. Department of Agriculture, was determined as this species. In some cases lawns had been injured, we were told, by these caterpillars.

THE CABBAGE PLUTELLA, *Plutella maculipennis* Curtis.
Family YPONOMEUTIDÆ, Order LEPIDOPTERA.

Cabbage and related garden plants are subject to the attacks of several very serious insect pests, and among these the cabbage plutella is least known of all. The small fusi-form, pale green

caterpillars sometimes become very abundant and, together with cabbage aphids and the European cabbage butterfly, very often ruin the crop unless measures are taken for their control. This insect was rather prominent throughout the state last season and was noticeably injurious in Bozeman. Though an introduced species this insect is well established and abundant on native vegetation. I have on several occasions seen it on wild vegetation in mountain canyons, far away from cultivated fields.

THE EYE-SPOTTED BUD-MOTH, *Tmetocera ocellana* Schrif. Family TORTRICIDÆ, Order LEPIDOPTERA.

In the spring of the year we received from Townsend specimens of what we believe to be the larvæ of this highly important pest. This insect has previously been found only from the western part of the state. Its injuries are most apparent in the spring, when the larvæ feed on the leaf-and flower-buds; not only destroying or lessening the fruit crop on bearing trees, but also causing serious injury to young growing trees by cutting off terminal buds and producing abnormal branching.

THE CURRANT SPANWORM, *Cymatophora ribearia* Fitch. Family GEOMETRIDÆ, Order LEPIDOPTERA.

This well known eastern species was found in a garden in Billings in June and was very abundant. It had almost completely defoliated the gooseberries on which it was working. A "looping" caterpillar which from the description and habits is probably this same insect was also reported from the Murr ranch a few miles west of Billings. The caterpillars are yellow with black spots and the moths are pale yellow with faint and variable markings of brownish.

THE ROSE SLUG, *Monostegia rosae*. Family TENTHREDINIDÆ, Order HYMENOPTERA.

This widely distributed pest of roses, feeds on the leaves, eating off the surface and causing the rest of the leaf to die and turn brown. Whole rose bushes are often given a brown color from this cause. This insect was particularly common in the vicinity of Bozeman last summer and was found also in other parts of the state. The green slugs or larvæ are so nearly of the color of the living rose leaf that

they are not easily detected. The remedy is Paris green or Hellebore applied to the leaves. See previous Reports for proportions.

THE NATIVE CURRANT SAW-FLY, *Gymnonychnus appendiculatus* Hartig. Family TENTHREDINIDÆ, Order HYMENOPTERA.

This insect is very injurious to gooseberry and currant foliage in Montana each year. This season it was very abundant in the middle and eastern portions of the state and in many cases the foliage was entirely taken. The slugs or larvæ are green in color and are thereby easily distinguished from the imported species in the same family and of similar habits, which, in the larval stage, is green dotted with black.

LEAF MINING BEETLE OF POPULUS, *Odontota*. Family CHRYSOMELIDÆ, Order COLEOPTERA.

In years past we have on a number of occasions been supplied with specimens of a larval beetle, probably belonging to the genus *Odontota*, which feeds very abundantly on the leaves of cottonwood (*Populus deltoides*) in the Yellowstone Valley. While in Billings and vicinity on various occasions during the season, this insect was found in great abundance but never in the adult stage. Repeated attempts at breeding the insect have proved unsuccessful and we are therefore uninformed as to its specific identity. The larva feeds within the leaf, mining out a large cavity which causes the affected part of the leaf to turn black. Many trees, by reason of the large number of injured leaves, presented a distinctly blackish general cast.

THE SPOTTED BLISTER-BEETLE, *Epicauta maculata* Say. Family MELOIDÆ, Order COLEOPTERA.

Members of the family Meloidæ are often mentioned as common and moderately injurious in the United States and in Montana. Though there are many representatives of this family, *Epicauta maculata* is much more often complained of than any other. It occurs throughout the state and is very abundant. During the year now closing it has been reported from various sections, and in our work in the Yellowstone Valley we have found it very common in sugar-beet fields. In one of the Experiment Station's

dry land fields in the eastern part of the state this insect did considerable damage. The insect is much more liable to be injurious on elevated lands and benches.

A MAY BEETLE AT CHESNUT, *Lachnosterna* near *fusca*.
Family SCARABÆIDÆ, Order COLEOPTERA.

We were informed early in May that great numbers of a large sized beetle had made their appearance in the vicinity of Chesnut. No damage was reported but the residents were interested to know about the insect. Accordingly on the eleventh we drove to Chesnut and found the beetles flying in abundance over the hill slopes. Specimens were captured and brought home. They turned out to be an unrecognized species near *Lachnosterna fusca*. The grubs of these beetles are U shaped. They live in the soil where they feed on the roots of plants, and are well known to every tiller of the soil. No injuries to vegetation need be feared from these insects.

GRASSHOPPERS. Order *Orthoptera*.

The outbreak of grasshoppers which amounted almost to a scourge a few years ago has not entirely abated, as is shown by the fact that in some parts of the state they were very abundant this season and in one locality on the Flathead Indian Reservation, over a wide extent of territory in the vicinity of Selish and St. Ignatius, they were so abundant as to attract considerable attention from the public. In this case, as in the cases previously reported, the principal species concerned were *Melanopulus atlanis*, Riley, and *Aulocara elliotti*, Thom., though as also in the case of the outbreak in the eastern part of the state, various other species were present in varying numbers.

THE CABBAGE APHIS, *Aphis brassicæ* Linn. Family APHIDIDÆ. Order HEMIPTERA.

The cabbage aphis is abundant and destructive each year, though in some years it is much more numerous than in others. This season it has been abundant and we have had occasion frequently to prescribe remedies and to send out our previously issued bulletins on the subject. The species occurs throughout the state.

THE OYSTER SHELL BARK-LOUSE, *Lepidosaphes ulmi* Linn. Family COCCIDÆ. Order HEMIPTERA.

This pest of the apple continues to be a prevalent and troublesome one. It is quite abundant in the western part of the state and is spreading slowly. This insect appears to be more prolific and injurious in Montana than, in the writer's experience, in the East.

THE WILLOW SNOW SCALE, *Chionaspis salicis-nigræ* Walsh Family COCCIDÆ. Order HEMIPTERA.

From our present knowledge it appears that only a remarkably small number of true scale-insects are native to the state of Montana. This species is the only member of its genus we have found. It was sent in during the summer by Mr. D. D. Magone of Thompson, thickly incrusting a piece of alder stem. It is of no great economic importance but it is of interest because of its close resemblance to the scurfy scale of apple, pear, currant, etc., which is of considerable importance but which has not yet been reported from Montana.

THE WHITE WINGED MARCH FLY, *Bibio albipennis* Say. Family BIBIONIDÆ. Order DIPTERA.

In a number of instances fruit growers have found this fly on their trees in considerable number in the Spring and we have repeatedly received specimens at the Experiment Station. The insects are slow at flight and cling to the foliage, grass or other objects on which they rest, in a clumsy fashion. The body is dark colored, contrasting strongly with the wings which are milky white. The larvae feed on decaying organic matter in damp places. Neither the larvae nor the adults are believed to be in the least injurious. This species was found in great numbers on currant bushes when in bloom on the Station farm during the middle of May.

Euthrips triticeæ. Order PHYSAPODO.

This widespread minute insect was sent to us by the T. C. Power Co. of Helena, who had received specimens on alfalfa blossoms from a grower in the northern part of the state who had put in a large crop for seed purposes. It was reported with the sending that from the outlook the crop would be almost a complete failure. From

their small size the insects might easily escape detection, yet great numbers of them were present and we believe that they were the cause of the injury to the seed crop. By its beak the insect extracts the juices from the tender succulent parts of the flower. We examined a large number of kinds of wild and cultivated blossoms in various parts of the state and found the insects in practically every blossom examined. This species was unusually common. No effective remedy is known for this insect.



